



COMMUNITY TOOLS AND RESOURCES: WAYS TO MITIGATE THE ADVERSE HEALTH IMPACTS OF WILDFIRE SMOKE

Tom Long, PhD

Assistant Director for Air and Energy

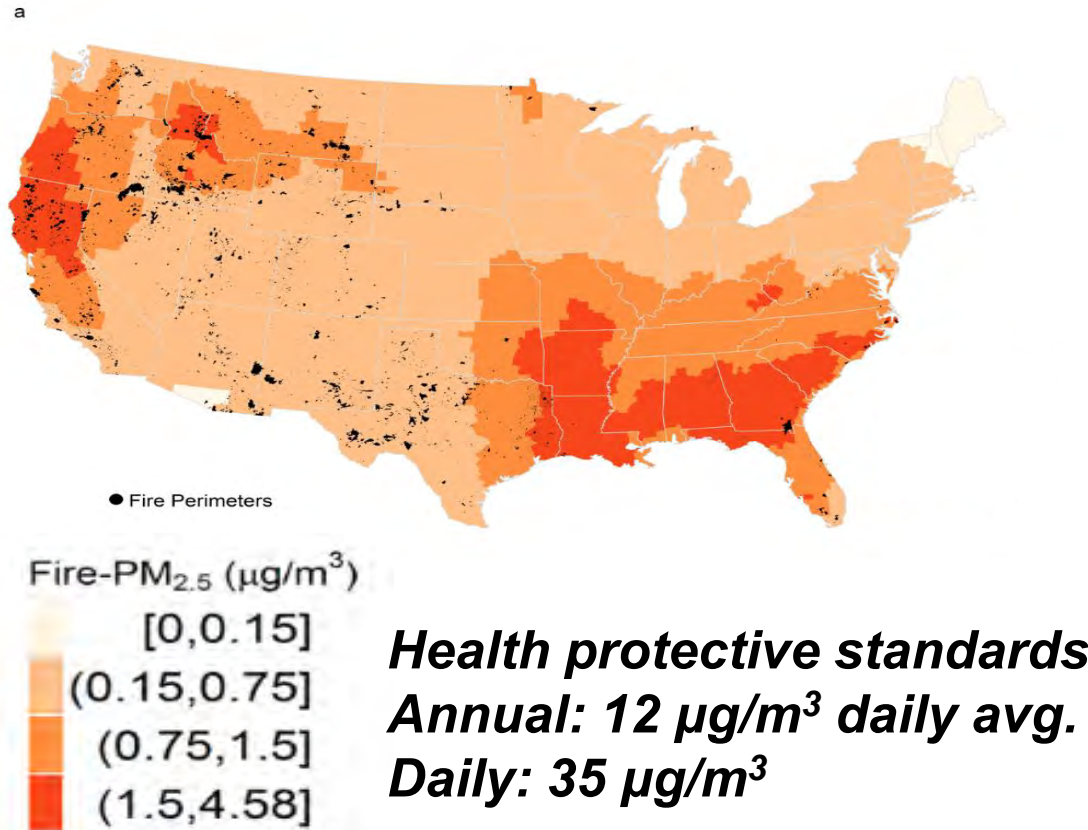
National Health and Environmental Effects Research Laboratory

Office of Research and Development, US EPA

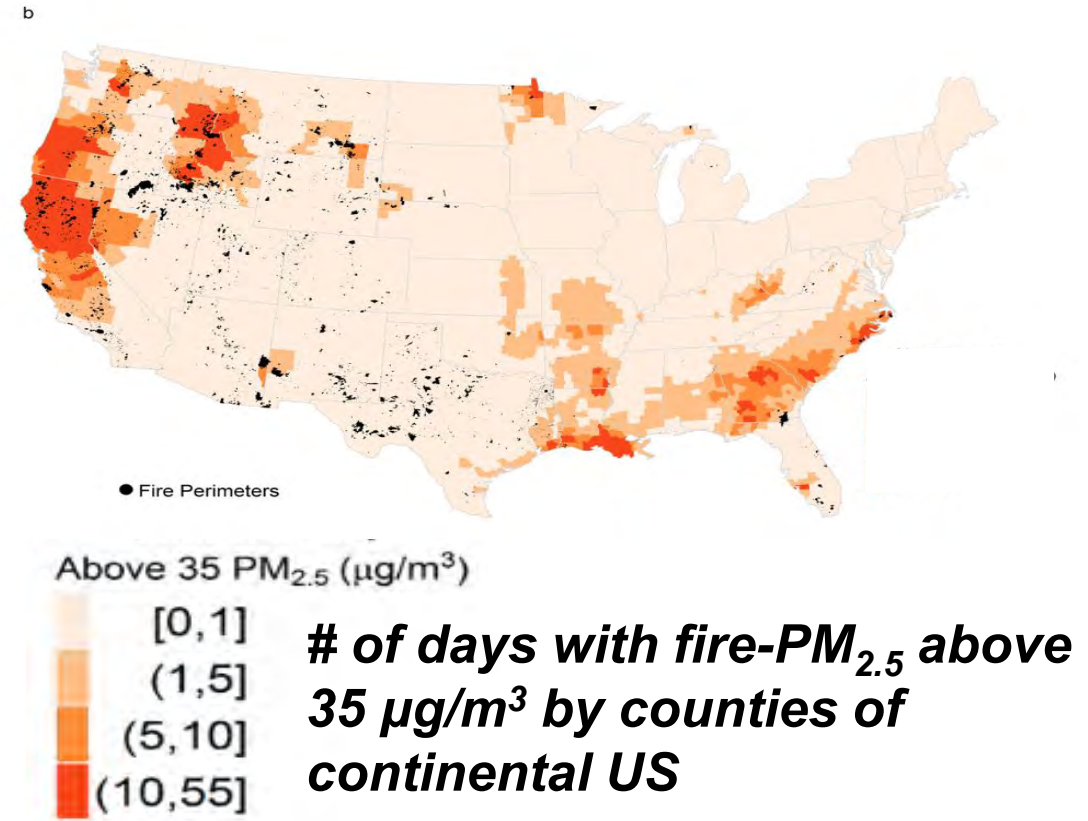
May 21, 2019

AIR QUALITY IMPACTS OF WILDLAND FIRES

Annual average daily fire-PM_{2.5} footprint for US counties



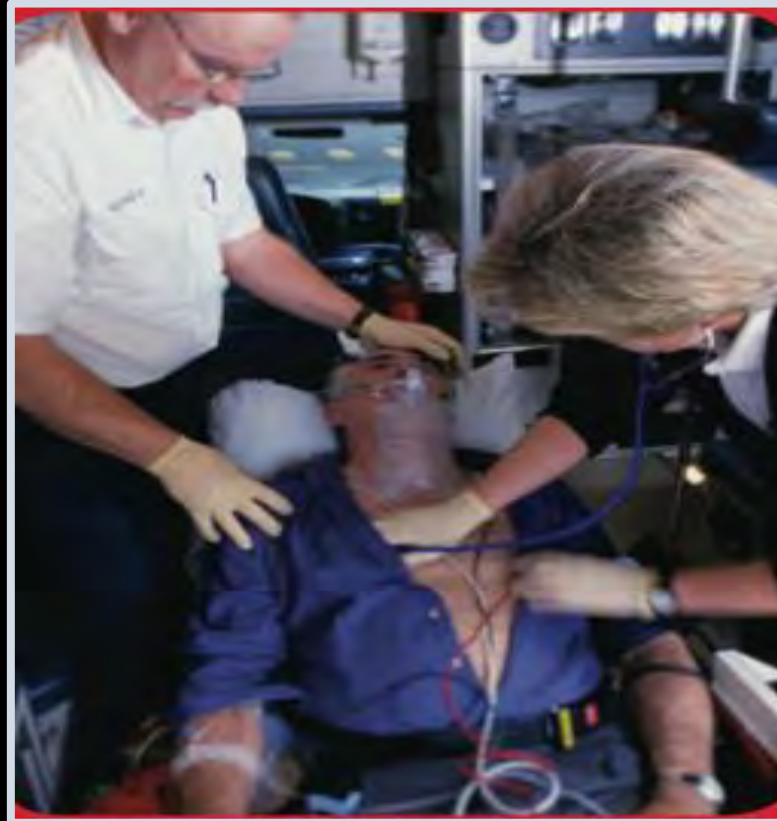
How much does smoke contribute to air quality and how often does it lead to exceeding daily standard?



Rappold AG, et al Environ Sci Technol 2017

WILDLAND FIRES & THEIR EMISSIONS

A COSTLY INDIVIDUAL AND PUBLIC HEALTH ISSUE



*Estimated Economic Value
of Wildfire-Attributed
 $PM_{2.5}$ -Premature Deaths
& Respiratory Admissions*

**Short-term
\$10-20 billion/year**

**Long-term
\$76-130 billion/year**

Fann N et al. *Science of the Total Environment* 610–611 (2018) 802–809

WILDLAND FIRE SMOKE HEALTH RISKS AND WHO IS MOST AT RISK

Known

- Respiratory effects
 - Asthma & COPD
 - Bronchitis & pneumonia
- Susceptible populations
 - Children, elders and those with chronic disease

Suspected

- All-cause mortality
- Cardiovascular effects
- Adverse birth outcomes

More data needed

- Risk of mortality
- Cardiovascular effects
- Susceptible populations

Review

A Section 508–conformant HTML version of this article is available at <http://dx.doi.org/10.1289/ehp.1409277>.

Critical Review of Health Impacts of Wildfire Smoke Exposure

Colleen E. Reid,^{1,2} Michael Brauer,³ Fay H. Johnston,^{4,5} Michael Jerrett,^{1,6} John R. Balmes,^{1,7} and Catherine T. Elliott^{3,8}

¹Environmental Health Sciences Division, School of Public Health, University of California, Berkeley, Berkeley, California, USA; ²Harvard Center for Population and Development Studies, Harvard T.H. Chan School of Public Health, Cambridge, Massachusetts, USA; ³School of Population and Public Health, University of British Columbia, Vancouver, British Columbia, Canada; ⁴Menzies Institute of Medical Research, University of Tasmania, Hobart, Tasmania, Australia; ⁵Environmental Health Services, Department of Health and Human Services, Hobart, Tasmania, Australia; ⁶Department of Environmental Health Sciences, Fielding School of Public Health, University of California, Los Angeles, Los Angeles, California, USA; ⁷Department of Medicine, University of California, San Francisco, San Francisco, California, USA; ⁸Office of the Chief Medical Officer of Health, Yukon Health and Social Services, Whitehorse, Yukon, Canada


Reid C et al. *Environ Health Perspectives* 2016;
124:1334–1343

PRESENTATION STRUCTURE


- 1. EPA's wildland fire smoke tools and resources**
- 2. Other tools from EPA on air quality and health**
- 3. Future directions for EPA's research and communications on the health effects of wildland fire smoke**

SMOKE-READY TOOLBOX FOR WILDFIRES


epa.gov/air-research/smoke-ready-toolbox-wildfires




Airnow.gov: Current Fire Conditions
Get current air quality conditions and learn what to do to protect your health from air pollution, including smoke from wildland fires. Airnow.gov provides local air quality forecasts using EPA's science-based air quality index. https://airnow.gov/index.cfm?action=topics.smoke_wildfires




How Smoke From Fires Can Affect Your Health
Learn who is more at risk from smoke, how to tell if it is affecting you, and steps you can take to protect your health. Learn what to do before, during and after a wildfire. <https://airnow.gov/index.cfm?action=smoke.index>




Wildfire Smoke: A Guide for Public Health Officials
The guide is an easy-to-use resource that outlines whose health is most affected by wildfire smoke, how to reduce exposure to smoke, what public health actions are recommended, and how to communicate air quality to the public. The recommendations are based on science conducted by EPA and others. https://www3.epa.gov/airnow/wildfire_may2016.pdf




Wildfire Smoke Exposure Infographics
Two infographics provide information on actions to take to reduce health risks from smoke exposure in areas with wildfire smoke and what respirator (mask) to wear if you have to go outside and how to wear it properly. https://www3.epa.gov/airnow/smoke_fires/reduce-health-risks-with-wildfire-smoke.pdf and <https://airnow.gov/static/topics/images/epa-infographic-respirator.jpg>



Smoke Sense App
The Smoke Sense mobile app, developed by EPA researchers, enables you to get information on air quality and learn how to protect your health from wildland fire smoke. The app is being used in a citizen science study to determine how smoke from fires impacts public health. The app is available for anyone to use and can be downloaded on Android or iOS. www.epa.gov/air-research/smoke-sense



Particle Pollution and Your Patients' Health Course
Particle pollution, also known as particulate matter or PM, is the main component of haze, smoke, and dust. This course provides health professionals with knowledge they can share with patients to help reduce overall risk of PM-related health effects, particularly in individuals with heart and lung disease. www.epa.gov/pmcourse



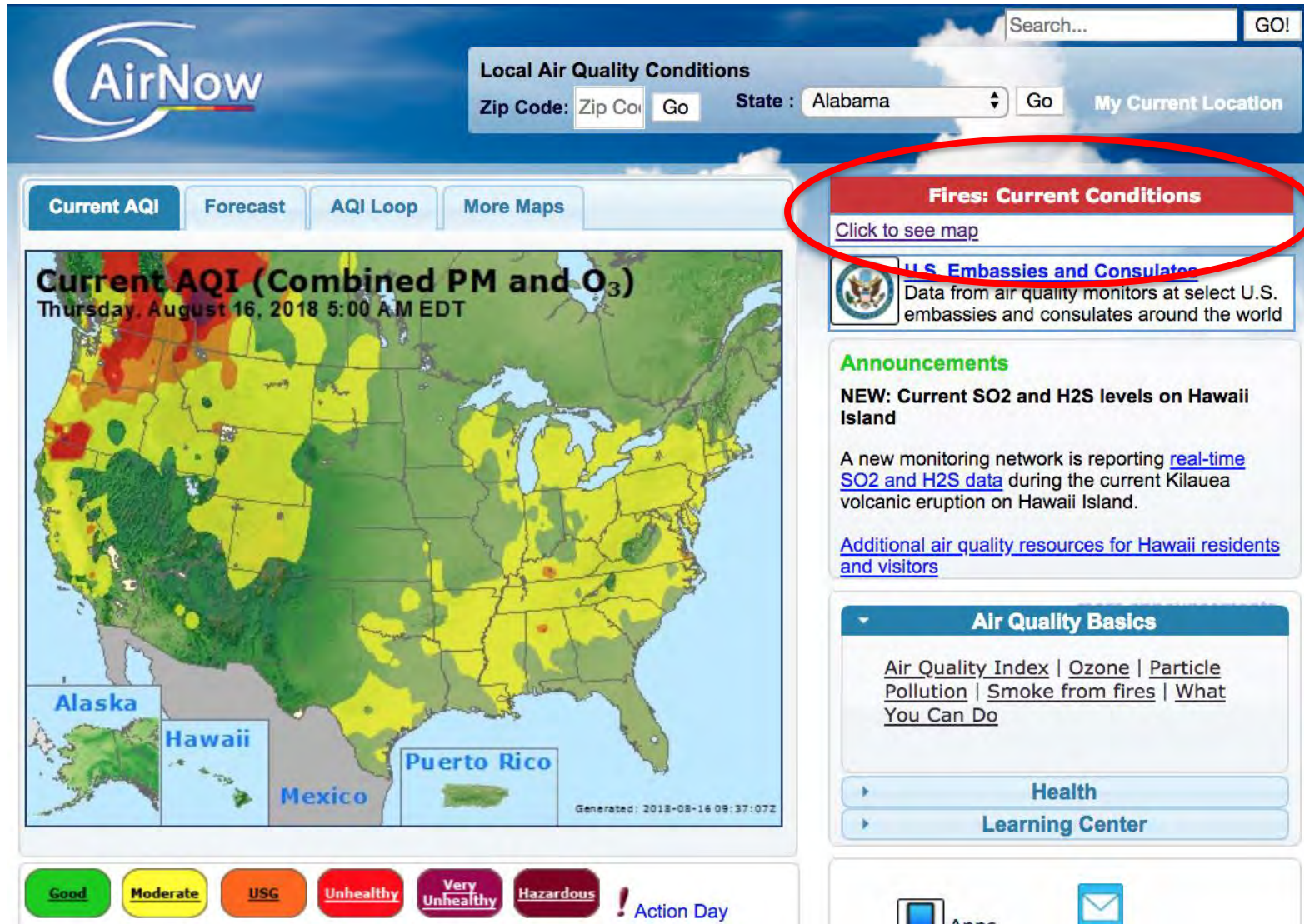
Online Healthy Heart Toolkit
Breathing in fine particulate matter (PM_{2.5}) can trigger heart attacks, ischemic stroke, abnormal heart rhythms and worsen heart failure in people with cardiovascular disease or older adults with medical conditions that put them at risk. Particle pollution is a main component of smoke. Use the toolkit to protect your heart. <https://www.epa.gov/air-research/healthy-heart-toolkit-and-research>

Smoke Ready Toolbox for Wildfires

- Resources health officials can use to educate the public about the risks of smoke exposure and actions people can take to protect their health

https://www.epa.gov/sites/production/files/2018-04/documents/smoke_ready_toolbox_for_wildfires_tagged.pdf

AIRNOW.GOV AND THE AIR QUALITY INDEX (AQI)



AQI – National uniform index mandated by Congress

Air Quality Basics

Fires: Current Conditions



Go

Local Air Quality Conditions

Zip Code:

Go

State :

Alabama



Go

[National Summary](#)

[Forecast](#)

[Current AQI](#)

[AQI Loop](#)

[More Maps](#)

Fires: Current Conditions

[Click to see map](#)



[U.S. Embassies and Consulates](#)

Today's AQI Forecast
Monday

Fires: Current Conditions

[Click to see map](#)



[corazón, ataques cerebrales y contaminación del aire](#)

[more announcements](#)

Air Quality Basics

[Air Quality Index](#) | [Ozone](#) | [Particle Pollution](#) | [Smoke from fires](#) | [What You Can Do](#)

[Health](#)

[Learning Center](#)

Good

Moderate

Unhealthy

Very Unhealthy

Hazardous

! Action Day



Apps



EnviroFlash Email

FIRES: CURRENT CONDITIONS PAGE

- **Current Smoke Map generated by NOAA Hazard Mapping System**
- **Current Advisories – State/Local/Tribal agency blogs**
- **Wildland Fire Air Quality Response Program**


Current Advisories

Fires and Health

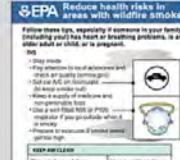
Before, During, and After a Wildfire

More Fire Tools

- [Prepare for Fire Season Factsheet](#) (2 pp., 24KB) [about PDF](#) - Learn how to protect your health from wildfire smoke.
- [Indoor Air Filtration Factsheet](#) (2 pp., 12KB) [about PDF](#)
- [Reduce Your Smoke Exposure Factsheet](#) (2 pp., 81KB) [about PDF](#)
- [Protect Yourself From Ash Factsheet](#) (2 pp., 84KB) [about PDF](#)
- [Respiratory Protection Factsheet](#) (2 pp., 32KB) [about PDF](#)
- [Protecting Children from Wildfire Smoke and Ash Factsheet](#) (2 pp., 5M) [about PDF](#)
- [Protect Yourself From Ash Factsheet](#) (2 pp., 84KB) [about PDF](#)
- [Protect Your Pets from Wildfire Smoke Factsheet](#) (2 pp., 37KB) [about PDF](#)
- [Protect Your Large Animals and Livestock from Wildfire Smoke Factsheet](#) (2 pp., 37KB) [about PDF](#)
- [Wildfire Smoke: A Guide for Public Health Officials - 2016](#) (76 pp., 3MB) [about PDF](#) - This document is designed to help local public health officials prepare for smoke events, to take measures to protect the public when smoke is present, and communicate with the public about wildfire smoke and health. It was updated in 2016 with the assistance and expertise from a number of federal and state agencies.
- The right respirator and proper fit can reduce your exposure to wildfire smoke.



EPA The right respirator... and proper fit can reduce your exposure to wildfire smoke.



EPA Reduce health risks in areas with wildfire smoke. Follow these tips, especially if someone in your home (including you) has heart or breathing problems, is an older adult or child, or is pregnant.

AirNow

Local Air Quality Conditions

Zip Code: Zip Co. Go State: Alabama Go My Current Location

Fires and Your Health

Smoke is made up of a complex mixture of gases and fine particles produced when wood and other organic materials burn. The biggest health threat from smoke is from fine particles. These microscopic particles can get into your eyes and respiratory system, where they can cause health problems such as burning eyes, runny nose, and illnesses such as bronchitis. Fine particles also can aggravate chronic heart and lung diseases - and even are linked to premature deaths in people with these conditions.

If you are healthy, you're usually not at a major risk from short-term exposures to smoke. Still, it's a good idea to avoid breathing smoke if you can help it. Everyone should take the steps below when wildfires are present.

Questions? Visit our [Frequently Asked Questions](#) page for answers to some common questions about health and smoke from wildland fires.



Fires and smoke across Alaska and Northern Canada [archive image courtesy of NASA MODIS](#)

Use common sense. If it looks smoky outside, it's probably not a good time to mow the lawn or go for a run. And it's probably not a good time for your children to play outdoors.

Pay attention to local air quality reports. Stay alert to smoke-related news coverage or health warnings.

Visit AirNow to find out the Air Quality Index in your area. As smoke gets worse, the amount of particles in the air changes - and so do the steps you should take to protect yourself. AirNow recommends precautions you can take to protect your health when air pollution gets bad.

If you are advised to stay indoors, take steps to keep indoor air as clean as possible. When smoke levels are high, try to avoid using anything that burns, such as wood fireplaces, gas logs, gas stoves - and even candles! Don't vacuum. That stirs up particles already inside your home. And don't smoke. That puts even more pollution in your lungs, and in the lungs of people around you.

If you have asthma or other lung disease, make sure you follow your doctor's directions about taking your medicines and following your asthma management plan. Call your doctor if your symptoms worsen.

Health Resources

- [Wildfire Smoke: A Guide for Public Health Officials - 2016](#) (76 pp., 3MB) [about PDF](#)
- [How Smoke from Fires Can Affect Your Health](#) - Learn steps you can take to protect your health.
- [Particle Pollution and Your Health](#) - Find out if you are at risk from exposure to particle pollution, and what health effects can be caused by particles.

Educational Resources

- [CDC Wildfire Fact Sheet](#) - Information on emergency preparedness and response.
- [California Air Resources Board SMP Public Outreach Protocol - Tools and Materials](#)
- [FOR KIDS - Follow Smokey Bear's advice](#) when wildfires are in your area!

Fires and Your Health


AirNow

Local Air Quality Conditions

Zip Code: Zip Co. Go State: Alabama Go

Fires: Current Conditions

May 9, 2016



CDC Centers for Disease Control and Prevention

CDC 24/7: Saving Lives. Protecting People™

SEARCH

CDC A-Z INDEX

Natural Disasters and Severe Weather

Natural Disasters and Severe Weather

Earthquakes +

Extreme Heat +

Floods +

Hurricanes +

Landslides & Mudslides +

Lightning +

Tornadoes +

Tsunamis +

Volcanoes +

Wildfires -

Before a Wildfire

During a Wildfire

After a Fire

Wildfires PSAs

Related Links

Winter Weather

Disaster Resources

Health and Safety Concerns for All Disasters

Are You Prepared?

Information for Specific Groups

Wildfires

More and more people make their homes in areas that are prone to wildfires. You can take steps to be ready for a wildfire and prepare your home and landscaping to reduce your risk. Learn how to protect yourself and your family from a wildfire, evacuate safely during a wildfire, and how to stay healthy when you return home.

Before a Wildfire

- [Wildfire: Are You Prepared?](#) [it](#)
- [Is your home firewise?](#) [it](#)
- [Make a Plan](#)

More >


During a Wildfire

- [Wildfire Smoke](#)
- [Wound Care](#)
- [Ready.gov Wildfires](#) [it](#)
- [Protecting Pets](#)
- [Animals in Evacuation Centers](#)

More >

After a Wildfire

- [What to Do After a Home Fire](#) [it](#)
- [Preventing Injury](#)
- [Returning Home After a Disaster](#)



[View a full-sized image](#) of the Be Ready: Wildfires infographic. Share it on social media or print it out to post in your office, school, or home.

Info for Specific Groups

- [Evacuees & Other Affected Persons](#)
- [Evacuation Centers](#)
- [Pregnant Women](#)
- [Responders](#)

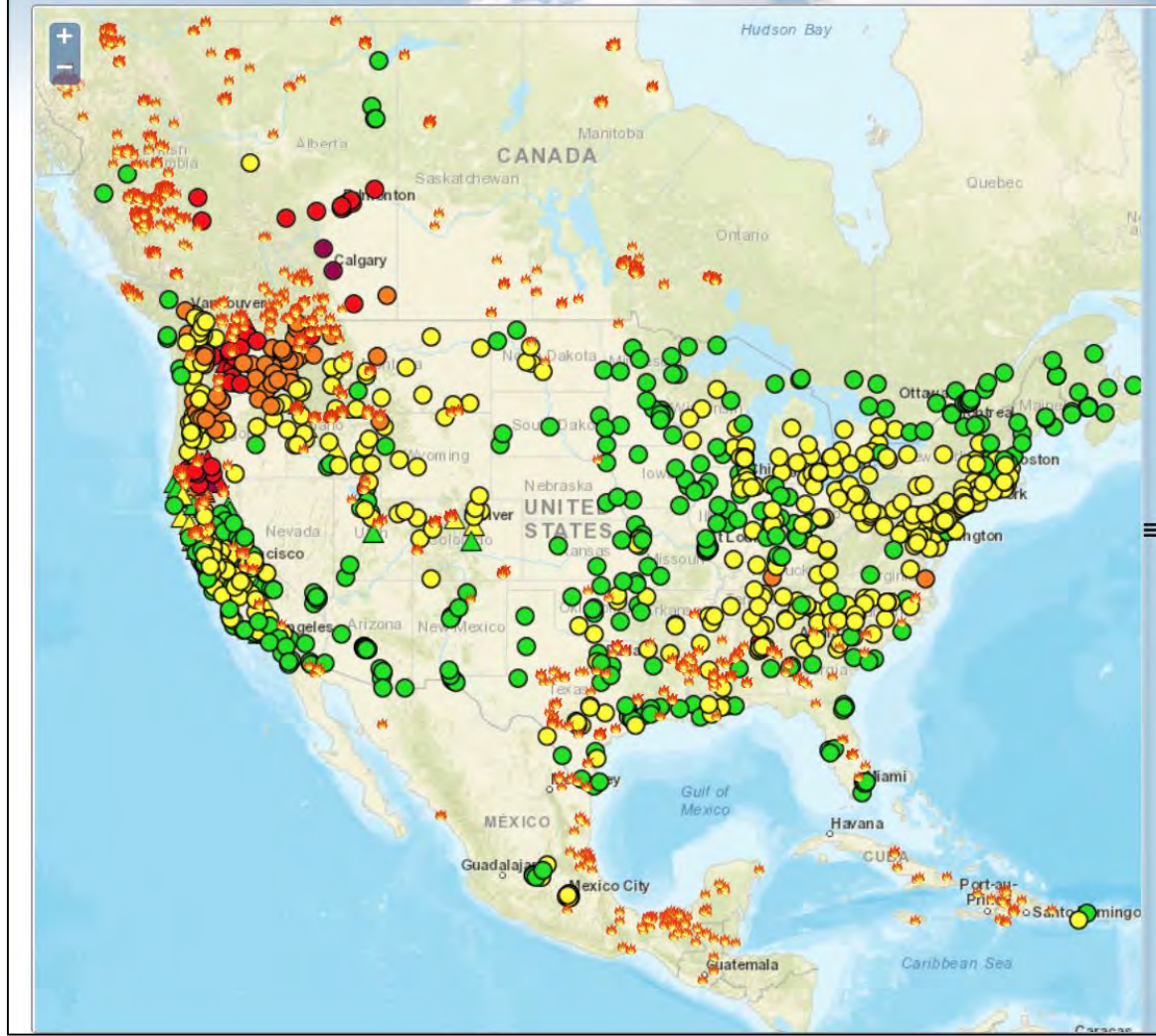
CDC: Before, During & After a Wildfire

More Fire Tools

9

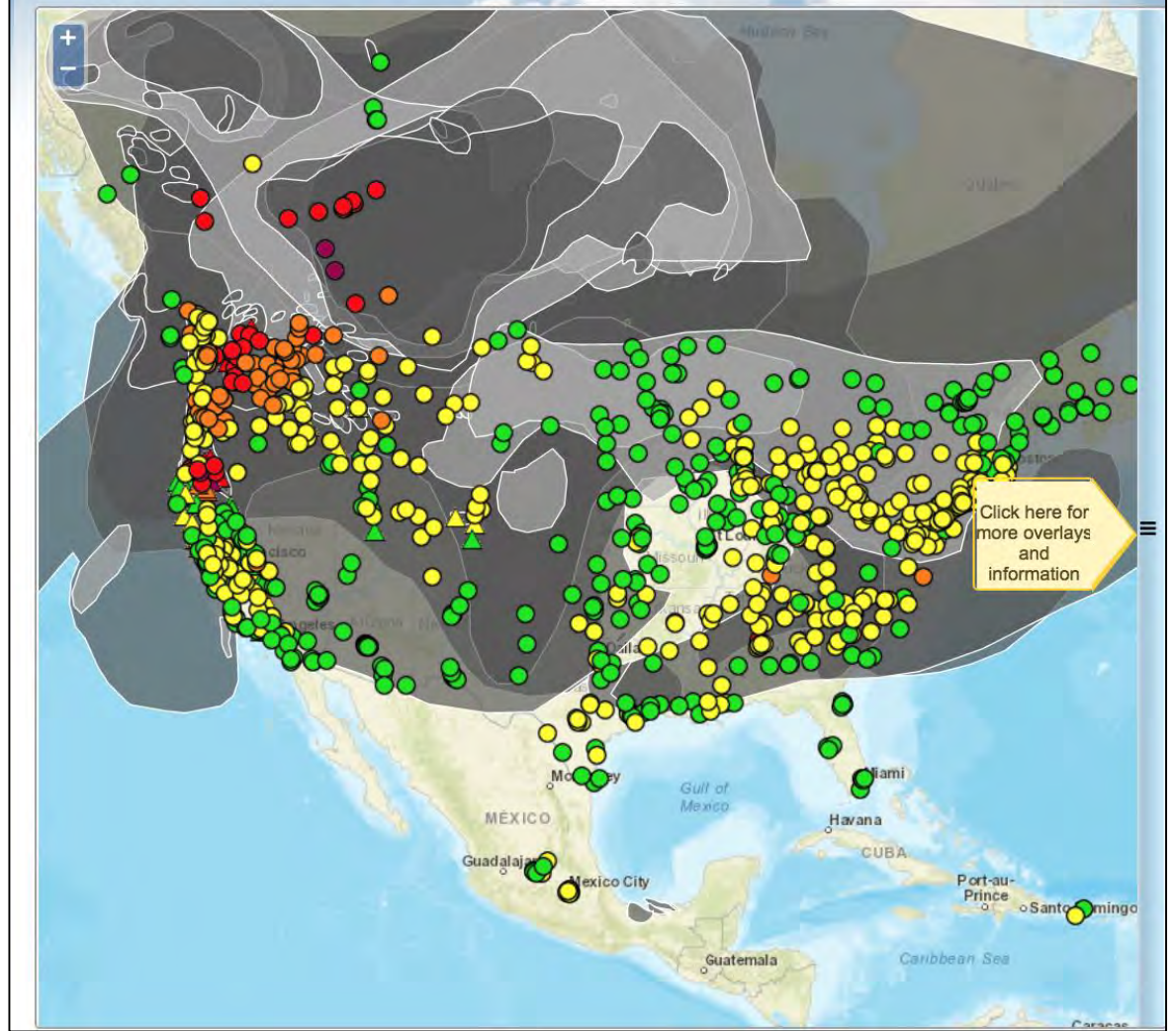
FIRES: CURRENT CONDITIONS

Fires: Current Conditions



AUGUST 16, 2018

Fires: Current Conditions



HOW SMOKE FROM FIRES CAN AFFECT YOUR HEALTH



Search...

GO!

Local Air Quality Conditions

Zip Code:

State :

My Current Location

How Smoke from Fires Can Affect Your Health

Updated January 2017

Smoke may smell good, but it's not good for you

While not everyone has the same sensitivity to wildfire smoke, it's still a good idea to avoid breathing smoke if you can help it. And when smoke is heavy, such as can occur in close proximity to a wildfire, it's bad for everyone.

Smoke is made up of a complex mixture of gases and fine particles produced when wood and other organic materials burn. The biggest health threat from smoke is from fine particles. These microscopic particles can penetrate deep into your lungs. They can cause a range of health problems, from burning eyes and a runny nose to aggravated chronic heart and lung diseases. Exposure to particle pollution is even linked to premature death.

Some people are more at risk

It's especially important for you to pay attention to local air quality reports during a fire if you are

- **a person with heart or lung disease**, such as heart failure, angina, ischemic heart disease, chronic obstructive pulmonary disease, emphysema or asthma.
- **an older adult**, which makes you more likely to have heart or lung disease than younger people.
- **caring for children, including teenagers**, because their respiratory systems are still developing, they breathe more air (and air pollution) per pound of body weight than adults, they're more likely to be active outdoors, and they're more likely to have asthma.
- **a person with diabetes**, because you are more likely to have underlying cardiovascular disease.
- **a pregnant woman**, because there could be potential health effects for both you and the developing fetus.



How to tell if smoke is affecting you

<https://airnow.gov/index.cfm?action=smoke.index>

WILDFIRE SMOKE GUIDE

ANTICIPATE AVAILABILITY LATE SUMMER/FALL



- **Updated look**
- **Smoke vs urban particles**
- **Addition of ozone**
- **Add sections**

- PM web course
- Ash clean-up
- Sensors



- **Stand-alone fact sheets**

- Children
- Older adults
- Pets/livestock
- Preseason preparedness
- Exposure reduction
- Know when to evacuate
- Respirator use

WILDFIRE SMOKE GUIDE: FACTSHEETS

FACT SHEETS BEING RELEASED AS APPROVED

WILDFIRE SMOKE FACTSHEET

Prepare for Fire Season



If you live in an area where the wildfire risk is high, take steps now to prepare for fire season. Being prepared for fire season is especially important for the health of children, older adults, and people with heart or lung disease.

Before a Wildfire

- **If any family member has heart or lung disease, including asthma,** check with your doctor about what you should do during smoke events. Have a plan to manage your condition.
- **Stock up** so you don't have to go out when it's smoky. Have several days of medications on hand. Buy groceries that do not need to be refrigerated or cooked because cooking can add to indoor air pollution.
- **Create a "clean room"** in your home. Choose a room with no fireplace and as few windows and doors as possible, such as a bedroom. Use a portable air cleaner in the room.
- **Buy a portable air cleaner** before there is a smoke event. Make sure it has high efficiency HEPA filters and it is the right size for the room.
- **Know how you will get alerts** and health warnings, including air quality reports, public service announcements (PSAs), and social media warning you about high fire risk or an active fire.
- **Ask** an air conditioning professional what kind of high efficiency filters to use in your home's system and how to close the fresh-air intake if your central air system or room air conditioner has one.
- **Have a supply of N95 respirators** and learn how to use them. They are sold at many home improvement stores and online.
- **Organize your important items** ahead of time, including financial and personal documents. Know your evacuation routes and where to go if you have to evacuate. Make sure to prepare your children, and consider your pets when making an evacuation plan.



WILDFIRE SMOKE FACTSHEET

Reduce Your Smoke Exposure



When wildfires create smoky conditions, there are things you can do, indoors and out, to reduce your exposure to smoke. Reducing exposure is important for everyone's health — especially children, older adults, and people with heart or lung disease.

Reduce smoke exposure indoors

- **Stay inside** with the doors and windows closed. Whether you have a central air conditioning system or a room unit, use high efficiency filters to capture fine particles from smoke. Ask an air conditioning professional what type of high efficiency filter your air conditioner can accept.
- **Seek shelter elsewhere** if you do not have an air conditioner and it is too warm to stay inside with the windows closed.
- **Do not add to indoor air pollution.** Do not burn candles or use gas, propane, wood-burning stoves, fireplaces, or aerosol sprays. Do not fry or broil meat, smoke tobacco products, or vacuum. All of these can increase air pollution indoors.
- **Use a portable air cleaner** to reduce indoor air pollution. Make sure it is sized for the room and that it does not make ozone, which is a harmful air pollutant. Portable air cleaners can be used along with efficient central air systems with efficient filters to maximize the reduction of indoor particles.
- **Create a "clean room"** in your home. Choose a room with no fireplace and as few windows and doors as possible, such as a bedroom. Use a portable air cleaner in the room.
- **Have a supply of N95 respirators** and learn how to use them. They are sold at many home improvement stores and online.
- Long-term smoke events usually have periods when the air is better. When air quality improves, even temporarily, **air out your home** to reduce indoor air pollution.



Use a portable air cleaner to reduce indoor air pollution

WILDFIRE SMOKE FACTSHEET

Protect Your Lungs from Wildfire Smoke or Ash



Wildfire smoke and ash can irritate your eyes, nose, throat, and lungs. They can make you cough or wheeze, and can make it hard to breathe. A respirator is a device (mask) that covers your nose and mouth, fits tightly to your face, and can filter out smoke or ash particles before you breathe them in. Respirators are not sized for children.

Protecting Your Health

The most effective way to protect yourself during wildfire emergencies is to stay indoors or limit your time outdoors when there is smoke in the air. This is especially important if you have heart or lung disease and are at higher risk for adverse health effects. Reducing physical activity and using HEPA-filtered air cleaners indoors are other ways to reduce your smoke exposure. Consider temporary relocation out of the smoky area if possible. By limiting your exposure one of these ways, you may not need to wear a respirator.

Respirators Can Help Protect Your Lungs



N95 or P100 respirators can help protect your lungs from smoke or ash. Straps must go above and below the ears.

How Do I Know if I Need to Wear a Respirator?

- People who stay indoors or limit their time outdoors during wildfire emergencies are doing the most effective thing to avoid exposure and may not need to wear a respirator.
- People who must be outside for extended periods of time in smoky air or an ash-covered area may benefit from using a tight-fitting N95 or P100 respirator to reduce their exposure.
- People experiencing health effects from a smoky environment, even if indoors, may also benefit from using a tight-fitting respirator to reduce their exposure.
- For people who want to wear a respirator, learning how to select and correctly use the respirator is important for achieving the most protection possible.

WILDFIRE SMOKE GUIDE: FACTSHEETS

FACT SHEETS BEING RELEASED AS APPROVED

WILDFIRE SMOKE FACTSHEET

Indoor Air Filtration



When wildfire smoke gets inside your home it can make your indoor air unhealthy, but there are steps you can take to protect your health and improve the air quality in your home. Reducing indoor sources of pollution is a major step toward lowering the concentrations of particles indoors. For example, avoid burning candles, smoking tobacco products, using aerosol products, and avoid using a gas or wood-burning stove or fireplace. Another step is air filtration. This fact sheet discusses effective options for filtering your home's indoor air to reduce indoor air pollution.

Filtration Options

There are two effective options for improving air filtration in the home: 1) upgrading the central air system filter, and 2) using high efficiency portable air cleaners. Before discussing filtration options, it is important to understand the basics of filter efficiency.

Filter Efficiency

The most common industry standard for filter efficiency is the Minimum Efficiency Reporting Value, or "MERV" rating. The MERV scale for residential filters ranges from 1 through 20. The higher the MERV rating the more particles are captured as the air passes through the filter. Higher MERV (higher efficiency) filters are especially effective at capturing very small particles that can most affect health.

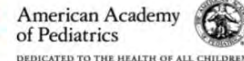
Central Air System Filter

The filter used in the central heating/cooling system of the home can effectively reduce indoor particle concentrations when the system is operating or when only the fan is turned on. Most home systems use a low MERV (1-4) fiberglass filter that is 1" thick. Replacing this filter with a medium efficiency filter (MERV 5-8) can significantly improve the air quality in your home. Higher efficiency filters (MERV 9-12) will work even better, and a true high efficiency

filter (MERV 13-16) can reduce indoor particles by as much as 95 percent. Filters with a High Efficiency Particulate Air (HEPA) rating, (or MERV 17-20) are the most efficient. You may need to consult with a local heating and air technician or the manufacturer of your central air system to confirm which (or if) high efficiency filters will work with your system. If you can't switch to a more efficient filter, running the system continuously by switching the thermostat fan from "Auto" to "On" has been shown to reduce particle concentrations by as much as 24 percent.

Portable Air Cleaners

Portable air cleaners are self-contained air filtration appliances that can be used alone or with enhanced central air filtration to effectively remove particles. How well they reduce air particle concentrations depends on several factors such as the size of the air cleaner, the area to be cleaned, the filter efficiency, how frequently the unit is turned on and the fan speed. Portable air cleaners fitted with high efficiency filters can reduce indoor particle concentrations by as much as 85 percent. Furthermore, portables can be operated continuously at a lower cost compared to the continuous operation of a central system.



WILDFIRE SMOKE FACTSHEET

Protecting Children from Wildfire Smoke and Ash



Background

- Children are especially at risk for health effects from exposure to wildfire smoke and ash, mostly because their lungs are still growing.
- Wildfire concerns include the fire itself, the smoke and ash, and the chemicals from materials that have burned, such as furniture.
- Smoke can travel hundreds of miles from the source of a fire. Pay attention to local air quality reports during fire season, even if no fire is nearby.

Health Effects from Wildfire Smoke and Ash

- Children who breathe in wildfire smoke and ash can have chest pain and tightness; trouble breathing; wheezing; coughing; nose, throat, and eye burning; dizziness; or other symptoms.
- Children with asthma, allergies, or chronic health issues may have more trouble breathing when smoke or ash is present.

Preparing for Wildfires

- Pay attention to local air quality reports. Stay alert to smoke-related news coverage and public health advisories.
- Look up your local [Air Quality Index \(AQI\)](http://www.airnow.gov) on the [AirNow](http://www.airnow.gov) (www.airnow.gov) web site.
- If [Enviroflash](http://www.enviroflash.info/) is available for your area, sign up for air quality alerts. (<http://www.enviroflash.info/>).

- Create a "clean room" in your home. Choose a room with few windows and doors. Buy a portable air cleaner you can use in this room. **Never** use an ozone-generating air cleaner.
- Stock up on food, medicine and child care supplies before the threat of a wildfire.
- Remember that you may need to leave your home. Plan for it and prepare your children.

During Wildfires

- Continue to listen to local reports and public health warnings.
- Keep children indoors with the doors and windows closed. Use your "clean room". If you have an air conditioner, run it with the fresh-air intake closed to keep outdoor smoke from getting indoors. Use your portable air cleaner as well. Reduce health risks by avoiding strenuous activities.
- Keep the indoor air as clean as possible. Do **not** smoke. Do **not** use gas, propane, or wood-burning stoves, fireplaces, or candles. Never use ozone-generating air cleaners. **Never** use natural gas or gasoline-powered generators indoors. Do **not** use spray cans. Do **not** fry or broil meat. Do **not** vacuum. All of these can lead to poor air quality.
- A good time to open windows to air out the house and clean away dust indoors is once air quality improves (check AirNow for updates).
- Use common sense to guide your child's activity. If it looks or smells smoky outside, if local air quality is reported as poor, or if local officials are giving health warnings, wait until air quality improves before your family is active outdoors.

WILDFIRE SMOKE FACTSHEET

Protect Yourself from Ash



Protect yourself from harmful ash when you clean up after a wildfire. Cleanup work can expose you to ash and other products of the fire that may irritate your eyes, nose, or skin and cause coughing and other health effects. Ash inhaled deeply into lungs may cause asthma attacks and make it difficult to breathe.

Ash is made up of larger and tiny particles (dust, dirt, and soot). Ash deposited on surfaces both indoors and outdoors can be inhaled if it becomes airborne when you clean up. Ash from burned structures is generally more hazardous than forest ash.

Avoid Ash Exposure

Avoid direct contact with ash. If you get ash on your skin, in your eyes, or in your mouth, wash it off as soon as you can.

People with heart or lung disease, including asthma, older adults, children, and pregnant women should use special caution around ash.

Children and pets: Children should not be nearby while you clean up ash. Do not allow children to play in ash. Clean ash off all children's toys before use. Clean ash off pets and other animals. Keep pets away from contaminated sites.

Recommended Actions

Clothing: Wear gloves, long-sleeved shirts, long pants, shoes and socks to avoid skin contact. Goggles are also a good idea. Contact with wet ash can cause chemical burns or skin irritation. Change your shoes and clothing before you leave the cleanup site to avoid tracking ash offsite, into your car, or other places.



Use an N95 respirator and avoid skin contact with ash.

Protecting your lungs: Wear a tight-fitting respirator that filters ash particles from the air you breathe to help protect your lungs. Select a respirator that has been tested and approved by NIOSH and has the words "NIOSH" and either "N95" or "P100" printed on it. These have two straps and are available online, and at many hardware stores and pharmacies. Buy respirators in a size that can be tightened over your mouth and nose with a snug seal to your face. Surgical masks and one-strap dust masks will **not** protect your lungs. They are not designed to seal tightly to the face. If you have heart or lung disease talk to your doctor before using a respirator or working around ash.

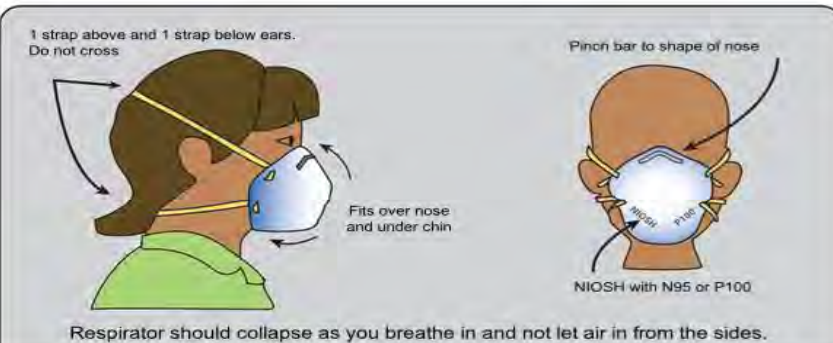
HOW TO USE A RESPIRATOR CORRECTLY: FACTSHEET



The right respirator* and proper fit can reduce your exposure to wildfire smoke.

Cloth (wet or dry), paper masks, and tissues will **NOT** filter out wildfire smoke. Look for respirators (masks) marked NIOSH with N95 or P100. They can be found online, or in hardware, home repair, or drugstores.

* Respirators are not designed to fit children. Facial hair prevents proper fit and reduces effectiveness.



Ask your doctor before using if you have heart or lung health issues.

Throw mask away if it's dirty or you find it difficult to breathe.

If you are dizzy or nauseous, go to where there is less smoke and seek medical attention.

Use a respirator only after first trying other, more effective methods to avoid smoke. That includes staying indoors and reducing activity. When possible, people at risk should move away from the smoke area.

airnow.gov

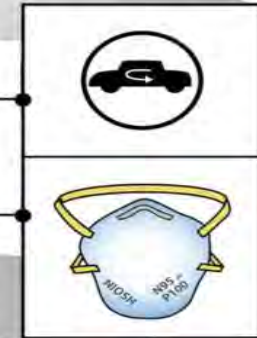


Reduce health risks in areas with wildfire smoke:

Follow these tips, especially if someone in your family (including you!) has heart or breathing problems, is an older adult or child, or is pregnant.

DO

- Stay inside
- Pay attention to local advisories and check air quality (airnow.gov)
- Set car A/C on recirculate (to keep smoke out)
- Keep a supply of medicine and non-perishable food
- Use a well-fitted N95 or P100 respirator if you go outside when it is smoky
- Prepare to evacuate if smoke levels get too high



KEEP AIR CLEAN

Close windows and doors.
Close fresh intake on A/C units.
If your home is too warm, try to stay with friends or relatives.

Use a portable air cleaner with HEPA filters properly sized for a specific room.

DON'T

- X Play or exercise outdoors
- X Fry or broil foods, which can add particles to indoor air
- X Use a fireplace, gas logs or gas stove
- X Smoke indoors
- X Vacuum, it can stir up dust



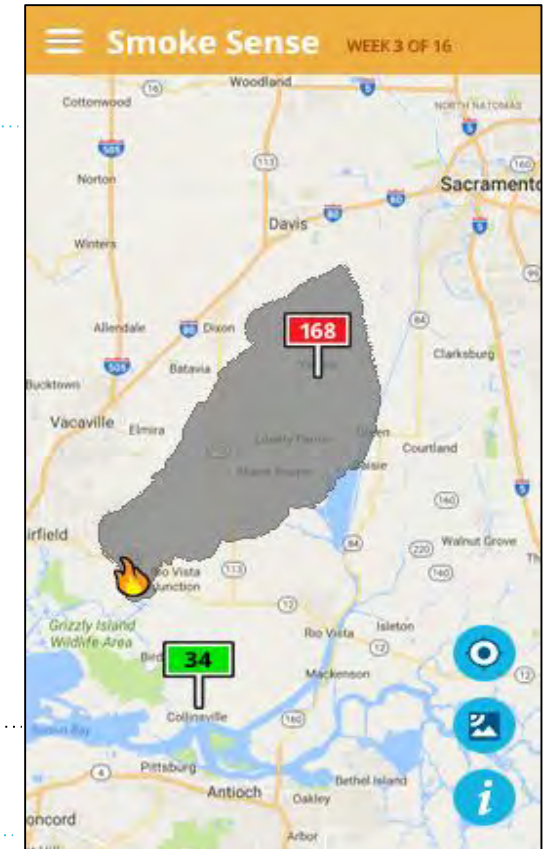
airnow.gov

CITIZEN SCIENCE: AIR QUALITY AND SMOKE PLUME INFORMATION

SMOKE SENSE

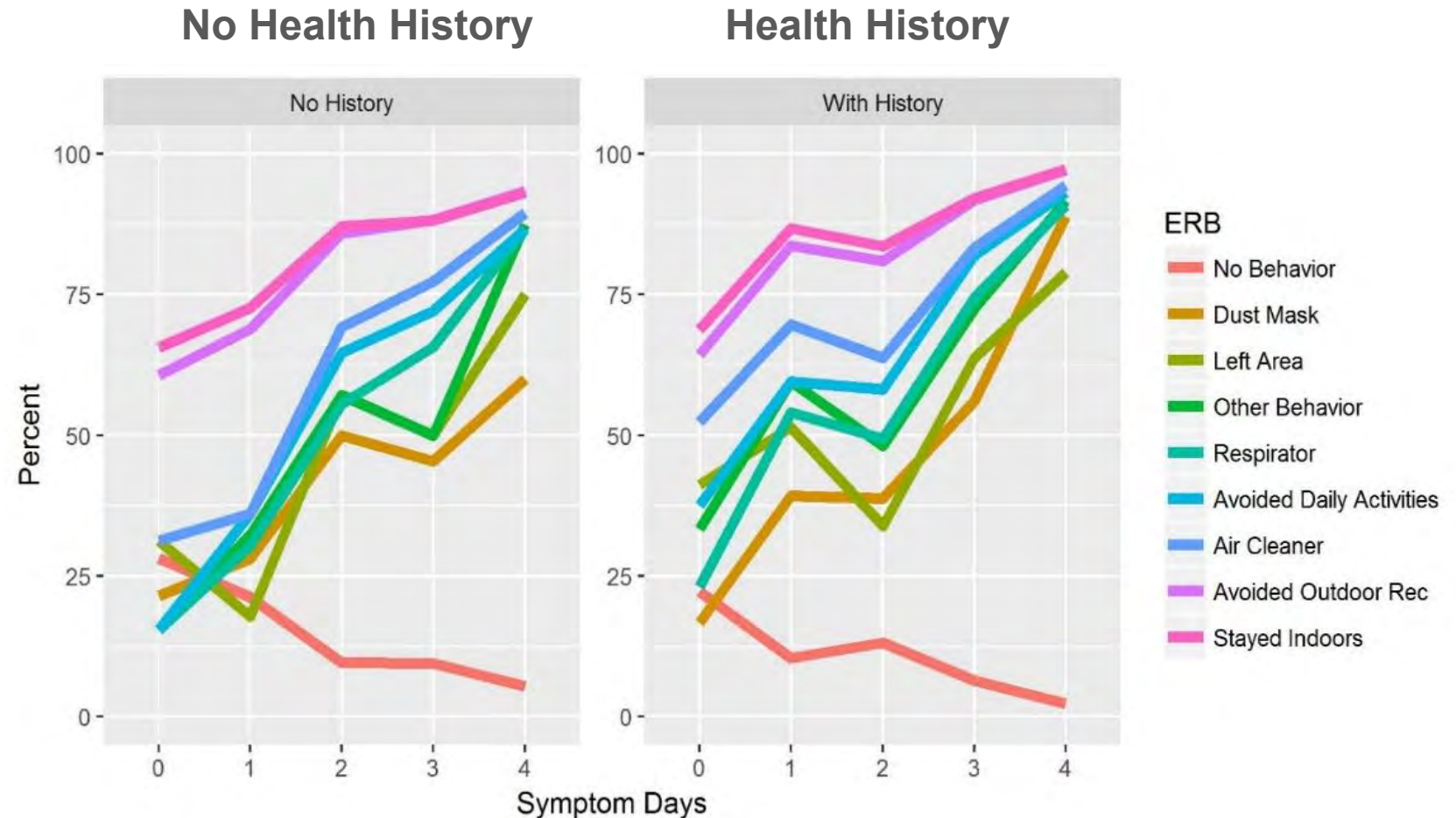


- **Smoke Sense provides information about current and future air quality**
- **Forecasted smoke plumes can be visualized**
- **Less time outside during smoke episodes to decrease exposure, & protect health**
- **Smoke Sense helps collect information about who, when, and how frequently people are impacted by smoke**
- **Information about smoke in the air and symptoms experienced in the past week will be logged**



CITIZEN SCIENCE: SMOKE SENSE AND EXPOSURE-REDUCING BEHAVIORS

- *Smoke Sense had >23,000 users and 100,000 sessions in 2017, with a 92% return rate*
- *User-provided information enables analysis of symptoms and exposure-reducing behaviors*
- *While 91% of users believe that smoke exposure affects health, exposure-reducing behaviors do not depend on health history and do not occur until after multiple days of exposure*
- *Indicates that behaviors are reactive not proactive*



OTHER EPA INITIATIVES: PARTICULATE MATTER WEB COURSE

FOR HEALTHCARE PROFESSIONALS AND EDUCATORS

CME credit from CDC to physicians, nurses and health educators

[Environmental Topics](#)[Laws & Regulations](#)[About EPA](#)

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Particle Pollution and Your Patients' Health

An evidence-based training course for healthcare providers that:

Course website - <https://www.epa.gov/pmcourse>

- Describes the biological mechanisms responsible for the cardiovascular and respiratory health effects associated with particle pollution exposure.
- Provides education tools to help patients understand how particle pollution exposure can affect their health and how they can use the Air Quality Index to protect their health.



This course is designed for family medicine physicians, internists, pediatricians, occupational and rehabilitation physicians, nurse practitioners, nurses, asthma educators, pulmonary specialists, cardiologists, and other medical professionals.

[Start the Course](#)

PARTICLE POLLUTION AND YOUR PATIENTS' HEALTH

CONTINUING EDUCATION COURSE CONTENT

- What is Particle Pollution?
- **Respiratory Effects**
- Cardiovascular Effects
- **Patient Exposure and High Particle Pollution Events**
- Clinical Scenarios
- Patient Education Tools

 United States Environmental Protection Agency

Environmental Topics Laws & Regulations About EPA

Particle Pollution and Your Patients' Health [CONTACT US](#) [SHARE](#)    

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[Patient Exposure & the Air Quality Index](#)
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Learn about the Particle Pollution and Your Patients' Health Course

On this page:

- [Course overview](#)
- [Course objectives](#)
- [Continuing education](#)
- [How to use this training](#)
- [Course evaluation](#)

Course Overview

Particle pollution, also known as particulate matter or PM, is the main component of haze, smoke, and dust. An extensive body of scientific evidence shows exposure to ambient particles can cause adverse cardiovascular effects and premature death and is likely to cause respiratory effects. People with heart or lung diseases, children (less than 18 years old), older adults, people with diabetes, and people of lower socio-economic status (SES) are the most likely to be affected by particle pollution exposure.

An easy way physicians and other health professionals can help reduce risk from exposure is through patient education. The simple steps of advising patients to check the air quality daily, and

Clinical Scenarios

The [Clinical Scenarios](#) section of this course discusses the following scenario and others in detail:

You have treated John for asthma since early childhood. He is skin test positive for house dust mite antigen. He is now a sixth grader and comes to your office with his mother. You are a bit surprised by the visit because his scheduled annual check-up is still a couple of months away. When inquiring why, you are told that he ran out of bronchodilator refills earlier than usual. His mother reports that during

EPA'S HEALTHY HEART PROGRAM

INCREASING ENVIRONMENTAL HEALTH LITERACY



EPA's Healthy Heart program aims to prevent heart attacks and strokes by:

- Raising public awareness about the role outdoor air pollution plays in cardiovascular health, and
- Steps individuals can take to reduce their pollution exposure

PARTNERING WITH MILLION HEARTS®

JOINT INITIATIVE OF CDC AND CENTERS FOR MEDICARE AND MEDICAID SERVICES



*EPA's contributes the **Healthy Heart** program to Million Hearts in the fight against heart attacks and strokes*

<http://millionhearts.hhs.gov/aboutmh/partners/epa.html>

EDUCATIONAL TOOLS ON PARTICLE POLLUTION

<https://millionhearts.hhs.gov>

Million Hearts®

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Medication Adherence
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Particle Pollution
Physical Activity
Tobacco Use

Tools & Protocols
Find treatment protocols, action guides, and other tools to help educate, motivate, and monitor your patients.

Data & Reports
Access the latest data and published research on heart disease and stroke.

Million Hearts®
millionhearts.hhs.gov

e-update

Tools You Can Use

- **New Million Hearts® website on physical activity promotes community programs and resources.** Physical activity is one of the most effective ways to prevent and manage heart disease, but just half of U.S. adults get enough. Take advantage of resources and information about community-based programs to boost physical activity in your community.
- **Vermont Department of Health releases Hypertension Management Toolkit.** The toolkit uses Lean quality improvement tools and methods to support evidence-based strategies that improve blood pressure control. A new statewide peer learning collaborative will share best practices to keep the toolkit updated.
- **Million Hearts® Tobacco Cessation Protocol now available on the go.** Find the CDC Protocol for Identifying and Treating Patients Who Use Tobacco on Epocrates, a free website and app for clinicians. (Registration may be required.)
- **A visual air quality alert makes air awareness easy.** The EPA's Air Quality Flag Program provides instructions on using physical and digital flags at your business or online to alert people to daily air quality.
- **New EPA toolkit details the link between heart problems and air pollution.** Use the Healthy Heart Toolkit to take steps to protect yourself and your community, sign up for air alerts, and download public education materials.

Million Hearts® in the Community

- **The District of Columbia Department of Health's Million Hearts® program builds a framework for success.** Learn how D.C.'s Million Hearts® program's strong partnerships, data monitoring, and targeted interventions have reduced CV disease morbidity and mortality in the nation's capital.
- **Find your niche when partnering with Million Hearts®.** Hospitals, employers, and clinical care teams in communities across the nation have tailored unique approaches to keeping people healthy, optimizing care, and helping priority populations. Learn how they did it—and then craft your own plan.
- **Million Hearts® continues engagement to find patients with hypertension "hiding in plain sight."** How many people in your practice have undiagnosed high blood pressure? Learn how to establish criteria for finding people with hypertension, implement evidence-based strategies to treat them, and improve their CV outcomes.
- **Pilot program with National Association of Community Health Centers (NACHC) shows progress in fighting hypertension.** In honor of National Health Center Week (Aug. 13-19), take the time to learn how Million Hearts® partner NACHC is making strides in blood pressure control.

The Science of Million Hearts®

- **Physicians experienced in health information technology are more likely to achieve 70% blood pressure control.** (*Journal of the American Medical Informatics Association*)
- **Lowering prices of fruits and vegetables could reduce the number of deaths from CV disease.** (*PLOS Medicine*)
- **A cost-benefit analysis shows how indoor air filtration may reduce mortality due to particulate matter.** (*International Journal of Indoor Environment and Health*)

You are receiving this newsletter because you are a Million Hearts® supporter.

Do This!
Share the EPA Air Quality Index with networks and people at risk.
Particle pollution puts people with CV conditions at higher risk for heart problems or stroke. Post this tool on your websites and social media so people can check air quality before they go outside for physical activity. Those at risk should avoid going outside on days ranked "orange" or worse and instead choose indoor versions of their favorite activities.

Quick Fact
One in three American adults has heart or blood vessel disease and is at higher risk from air pollution, which can trigger heart attacks and strokes and arrhythmias.

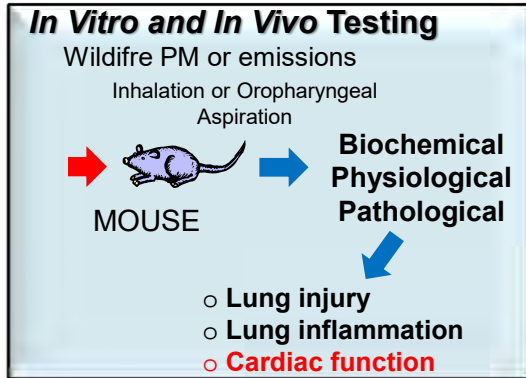
WILDLAND FIRE SMOKE AND HEALTH

FUTURE DIRECTIONS

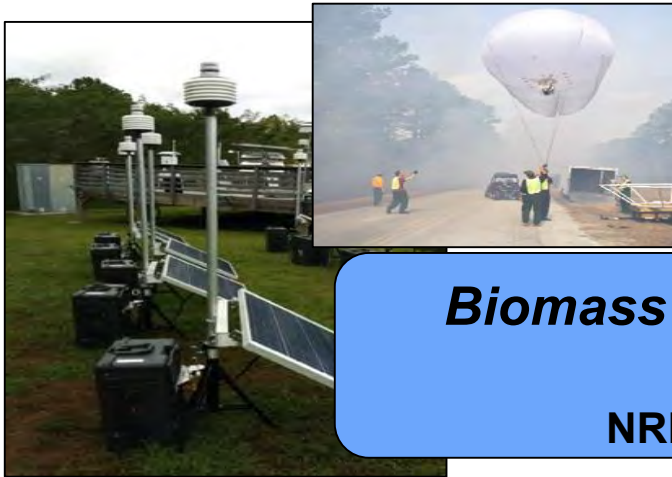
- **Do health effects from short-term exposures to high concentrations differ from long-term exposures to low concentrations of smoke?**
- **Do health effects from smoke from wildfire differ from prescribed fire?**
- **Is the toxicity of smoke modified by fuel type or burning conditions, or mixing with urban air pollution?**
- **Is there a concentration at which evacuation should be ordered?**



DOING SOLUTION-DIRECTED SCIENCE



**Smoke Exposure
(Monitors/Sensors)**
NERL, NRMRL



**Biomass Emissions Factors &
Speciation**
NRMRL, OAR-OAQPS

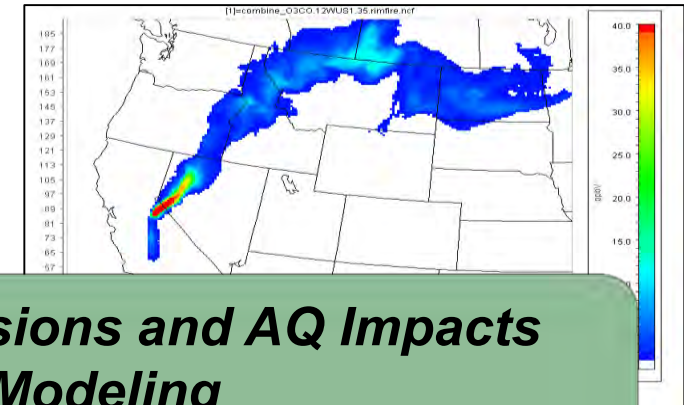
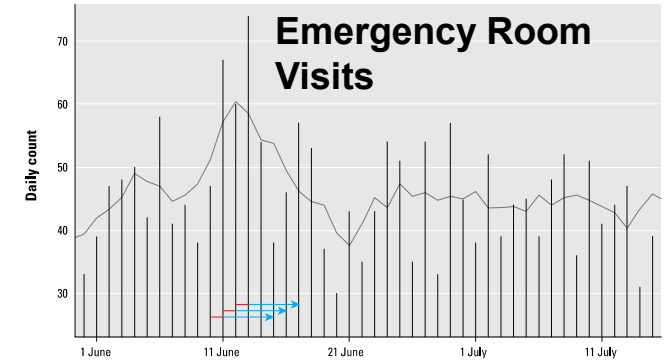
Smoke Toxicology
NHEERL

**EPA A&E
Wildland
Fire
Research**

**FASMEE Initiative w/
OAR-OAQPS**

**Smoke Emissions and AQ Impacts
Modeling**
NERL, OAR-OAQPS

**Smoke Epidemiology and
Public Health**
NHEERL, OAQPS



WILDLAND FIRE SENSORS CHALLENGE

MULTI-FEDERAL AGENCY CHALLENGE TO PRODUCE A SENSOR CAPABLE OF RAPID DEPLOYMENT AND CONTINUOUS MONITORING OF AIR POLLUTION DURING A FIRE EVENT



First Place Award



Jason Gu (left) and Bryan Tomko of SenSevere/Sensit Technologies in Pittsburgh, Pennsylvania, with R. Subramanian of Carnegie Mellon University, received first place and \$35,000.

Second Place Award



Scott Waller (left) and Andrew Smallridge of Thingy LLC, Bellevue, Wash. received second place and \$25,000.

PROTECTING POPULATION HEALTH – TRANSLATIONAL SCIENCE

DEVELOP, IMPLEMENT, AND EVALUATE THE IMPACT OF PUBLIC HEALTH COMMUNICATION ON POSITIVELY AFFECTING PROTECTIVE DECISIONS

Evaluate the effectiveness of:

- communication strategies
- interventions to decrease wildfire smoke exposures, and
- lower biomarkers of exposure to wildfire smoke, and
- adverse health outcomes

Translational Pilot Project in Missoula, MT

- Partnering with the local health department to evaluate the use of filtration devices in homes and public buildings
- Create “clean air spaces” in schools, libraries, senior centers, fitness centers



THANK YOU

Tom Long, PhD

Assistant Director for Air and Energy

National Health and Environmental Effects Research Laboratory

Office of Research and Development

U.S. Environmental Protection Agency

Email: long.tom@epa.gov

- No conflicts of interest
- Disclaimer: The presentation represents the opinions of the speaker and does not necessarily represent the policies of the US EPA